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**IN THE CLAIMS**

1. (Currently Amended) An air purification system comprising:  
a substrate; and  
a coating applied on said substrate; and  
an a microwave energy source to desorb operative to emit microwaves having a predetermined frequency for desorbing water vapor that adsorbs absorbed on said coating; and  
an enclosure at least partially surrounding said microwave energy source, said enclosure including porous screens for containing the microwaves in the enclosure.
- 2.-3. (Cancelled)
4. (Original) The air purification system as recited in claim 1 wherein said coating is a photocatalytic coating.
5. (Original) The air purification system as recited in claim 4 wherein said photocatalytic coating is titanium dioxide.
6. (Original) The air purification system as recited in claim 4 wherein said photocatalytic coating is one of  $\text{Fe}_2\text{O}_3$ ,  $\text{ZnO}$ ,  $\text{V}_2\text{O}_5$ ,  $\text{SnO}_2$ , and  $\text{FeTiO}_3$ .
7. (Original) The air purification system as recited in claim 4 wherein said photocatalytic coating includes a metal oxide loaded on a photocatalytic material.
8. (Currently Amended) The air purification system as recited in claim 7 wherein said metal oxide is one of  $\text{WO}_3$ ,  $\text{ZnO}$ ,  $\text{CdS}$ ,  $\text{SrTiO}_3$ ,  $\text{Fe}_2\text{O}_3$ ,  $\text{V}_2\text{O}_5$ ,  $\text{SnO}_2$ ,  $\text{FeTiO}_3$ ,  $\text{PbO}$ ,  $\text{Co}_3\text{O}_4$ ,  $\text{NiO}$ ,  $\text{CeO}_2$ ,  $\text{CuO}$ ,  $\text{SiO}_2$ ,  $\text{Al}_2\text{O}_3$ ,  ~~$\text{Mn}_2\text{O}_3$~~   $\text{MnO}_2$ ,  $\text{Cr}_2\text{O}_3$ , and  $\text{ZrO}_2$ .
9. (Original) The air purification system as recited in claim 4 further including a light source to activate said photocatalytic coating, and said photocatalytic coating oxidizes

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contaminants that are adsorbed onto said photocatalytic coating when activated by said light source.

10. (Currently Amended) The air purification system as recited in claim 9 ~~further including a surrounding enclosure defined by porous screens defining an energy cavity, wherein said enclosure defines an energy cavity therein, and said substrate, and said photocatalytic coating,~~ and said light source are located in said energy cavity.

11. (Currently Amended) The air purification system as recited in claim 9 ~~further including a surrounding enclosure defined by porous screens and defining an energy cavity, wherein said enclosure defines an energy cavity therein, and said substrate and said photocatalytic coating are~~ located within said ~~surrounding enclosure~~ and said light source is located outside of said ~~surrounding enclosure~~.

12. (Original) The air purification system as recited in claim 9 wherein said light source is an ultraviolet light source.

13. (Original) The air purification system as recited in claim 9 wherein said light source is an ozone generating lamp.

14.-15. (Cancelled)

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16. (Original) The air purification system as recited in claim 9 wherein light from said light source does not couple with said desired wavelength of energy.

17. (Original) The air purification system as recited in claim 1 wherein said substrate is an array of voids separated by a solid.

18. (Original) The air purification system as recited in claim 1 wherein said air purification system operates at room temperature.

19.-20. (Cancelled)

21. (Currently Amended) The air purification system as cited in claim 1 wherein said desired predetermined frequency is 17 GHz at 20°C.

22. (Currently Amended) The air purification system as cited in claim 1 wherein said predetermined ~~desired~~-frequency is 38 GHz at 50°C.

23. (Cancelled)

24. (Original) An air purification system comprising:  
a substrate; and  
an a radiowave energy source operative to generate a desired wavelength of energy to desorb for desorbing water vapor that adsorbs absorbed on said substrate.

25. (Cancelled)

26. (Original) The air purification system as recited in claim 24 wherein said substrate is photocatalytic.

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27. (Original) The air purification system as recited in claim 26 wherein said substrate is titanium dioxide.

28.-29. (Cancelled)

30. (New) The air purification system as recited in claim 1, wherein said porous screens comprise wire screens.

31. (New) The air purification system as recited in claim 1, wherein said porous screens comprise openings that are smaller than a wavelength of the emitted microwaves.